



International Journal of Sanskrit Research

अनन्ता

ISSN: 2394-7519
IJSR 2017; 3(5): 109-111
© 2017 IJSR
www.anantaajournal.com
Received: 17-07-2017
Accepted: 18-08-2017

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Plant physiology in Sanskrit literature

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Abstract

Sanskrit is known as the language of knowledge (Jñyānabhāṣā). Thus various shades of scientific knowledge are spread in the literature. This is the need of the 21st century to have interdisciplinary study. This paper is an attempt to find the root of plant physiology through Sanskrit literature. 'Do the plants have the sense organs like human beings' is the basic question regarding the plants. Author has tried to find the roots from Sanskrit literature and its modern significance.

Keywords: Plant physiology, Sense organs, Plants, Human being, modern science, Cleave Backstar, Sir Jagdishchandra Bose

Introduction

India is the homeland for Sanskrit studies. Sanskrit literature is the vast and various scientificity has been spread in the literature. Many times unintentionally authors have thrown light on the scientific gesture. This paper is an attempt to find out the roots of sensitivity of plants.

Bruhadaranyaka Upanishad compares a human being with tree. In the third chapter it is stated that - just like a tree, the prince of forest, so the man is, in truth, his hairs are the leaves, his skin resembles the external bark. Out of his skin streams forth the blood- like a juice or sap out of tree; if the blood flows out from the wounded man, the flesh is comparable to the wood (of the tree), the sinews are like the inner bark, the strong bones are like the inner core of the wood, the marrow resembles the marrow (pith) of the tree ^[1].

Mahabharata is the greatest epic in the Sanskrit literature. Though it is the story of battle, it also discusses various subjects. In the Shantiparva ^[2] of it, the reference is found regarding the plant's senses.

In the Shantiparva there is a dialogue between Bharadvaja and Bhrgu ^[3], in which Bharadvaja asked questions and Bhrgu answered. Bharadvaja asked a question that how the state of being an element of five only is experienced ^[4]? As an answer to this question, Bhrgu has stated five elements Activity is wind, the Sound is space, the heat that lives within it is fire, the liquid juices contained in it are water, and the solidified matter from Earth. The bodies thus are made of five elements ^[5]. Further he states that all movable and immovable objects are formed of these elements. The five senses also made of the given elements. The ear is formed of the property of space, the nose of earth, the tongue of water, touch of wind and eyes of fire ^[6]. Though it is explained by Bhrgu, Bharadvaja is not convinced and further he asked if all movable and immovable objects be made of these five elements, why it is that in all immovable objects those elements are not seen? He strongly states that trees do not appear to have possessed any heat. They appear to have no motion. They are again formed of thick particle. The five elements are not seen in them ^[7]. Trees do not hear and see, they do not taste and smell. They cannot touch. How then can they regard as formed of the five elements ^[8]? So trees cannot be considered as compounds of the primary elements. Bhrgu answered these questions thoroughly. Though possessed of density, trees have space within them. They always bear flowers and fruits. Now Bhrgu states a fact about each and every element ^[9].

1. Touch: They have heat within them in consequence of which leaf, bark, fruit and flower are seen to droop. They sicken and dried up, that shows the perception of 'touch' ^[10].

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2. **Ears:** Through sound of wind and fire and thunder, their fruits and flower drop down. Sound is perceived through the ears. Therefore trees have ears and they do 'hear' ^[11].
3. **Eyes:** A creepers winds round a tree and goes about all its side. A blind cannot find its way. For this reason, it is evident that trees have 'vision' ^[12].
4. **Nose:** Then again trees recover vigour and put forth flowers in consequences of good and bad of the sacred perfume of diverse kinds of Dhupas. It shows that trees have smell ^[13].
5. **Tongue:** They drink water by their roots. They catch diseases again are cured by different operations. From this it is evident that trees have perception of 'taste' ^[14].

In this way Mahabharata has stated that plants possess sensitivities that mean they are capable of feeling the touch and other senses.

Modern Science

The modern science regarding the plant perception is known as plant physiology. Physiology is the science of function and phenomena of living organism and their parts. It deals with the various functions and reactions that plant perform ^[15]. In the study of plant physiology plant perception is the term used to describe mechanism by which plants recognize changes in the environment ^[16].

Generally while discussing the plant organ system, there are two basic and familiar systems, the root system and shoot system ^[17]. These two systems are explained in detail in the plant physiology. In the book Plant Physiology Fundamentals and Applications, naturally the basic information regarding the plants like the plant cell, biophysics, absorption of water and mineral elements by plants, the photosynthesis etc. is discussed. Here in this paper we are dealing with the plant senses. This particular kind is very rarely discussed in this branch. Instead of this the movements of plants are discussed. From which one can easily drawn the sense perception. "When a plant receive any environmental stimulus that causes the response". It is very difficult to answer following questions related to plant response because such plant organs as leaves, stems, and roots, unlike eyes, ears, are not specialized to respond only to one stimulus.

1. What pigment absorbs the light causes phototropism?
2. What, in the cells or tissues, responds to gravity?
3. Where in the plant is the perception mechanism located?
4. What is the mechanism? ^[18]

According to a scientist, "It is not easy to describe the senses that plants have. That is because we are also living with the limited perception of life". A plant seems to have an even slower outlook on its environments ^[19].

Indian scientist, Sir Jagdishchandra Bose (1858-1937) was the one who began to conduct experiments on plants in the year 1900. He found that every plant and every part of plant appeared to have a sensitive nervous system. He also claimed that plants can feel pain, understand affection etc. He has proved this fact with various experiments ^[20]. After Prof Bose, Cleave Backstar (1924-2013) was the famous scientist. He has done various experiments on the plants. He is one who accepts the senses and tried to observe the reactions of plants. He has firmly stated that "Plants have consciousness and sensitivity. They are able to react, through their sense organs" ^[21].

Perception of sense organs regarding human being is also varies by person to person. E.g someone can smell acutely than some other. Similarly the plants perceive the perceptions

differently e.g - the plant *Mimosa pudica* in ordinary language it is known as shameful plant. After touching leaf of that particular bush, leaf shy. This shows that plants do have the sense organs, though not in the visible forms but through perception they are experienced. Thus, the Indians also have the scientific attitude though it is turned into Dharma or Poetry.

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6. Ityete pañcabhirbhūtairiyuktaṁ sthāvarjaṅgamam | Śrotram ghrānam rasaḥ sparśo dṛṣṭīścendriyasamjñitā | Shantiparva 184.5
7. Pañcabhiryadi bhūtaistu yuktāḥ sthāvarjaṅgamāḥ | sthāvarāṇā na dṛśyante śarīre(ṣu) pañcadhātavaḥ | Shantiparva 184.6
8. Anūsmāṇāmeṣṭānāmaghanānām caiva tattvataḥ | vṛkṣāṇām nopalabhyante śarīre(ṣu) pañcadhātavaḥ || Shantiparva 184.7
9. Na śṛṅvanti na paśyanti na gandharasavedināḥ | Na ca sparśam vijānanti te katham pañcabhautikāḥ | Shantiparva 184.8
10. Ghanānāmapī vṛkṣāṇāmākāśosti na saṁśayaḥ | Teṣāṁ puṣpaphale vyaktirityam samupalabhyate | Shantiparva 184.10
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